Journal of the Society of Arts.

FRIDAY, APRIL 5, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

April 10.—"On the Operation of the Chain Cables and Anchors Act, 1864." By Robert Galloway, Esq., C.E., Chief Surveyor of Steam Ships and Examiner of Engineers, and Inspector of Proving Establishments, Apparatus, and Machinery.

April 17.—*Passion Week.* No Meeting.

Cantor Lectures.

The next Lecture of the Course, "On Music and Musical Instruments," by John Hullah, Esq., will be delivered as follows :—

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Mediæval Instruments, &c.

Mr. Hullah having found it impossible to deal with so extensive a subject as musical instruments in the two lectures originally assigned to it, it is proposed to extend the course by one or possibly two lectures. Particulars will be duly announced.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Final Examinations.

Owing to the death of the Dean of Hereford, Examiner in Domestic Economy, and to the resignation of Mr. John Marshall, F.R.S., Examiner in Animal Physiology, the Council have appointed Examiners as follows :—

Domestic Economy ..	E. Carleton Tufnell, Esq., one of Her Majesty's Inspectors of Schools.
Animal Physiology ..	Michael Foster, Esq., M.D., Teacher of Practical Physiology in University College, London.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The following letter was addressed, by desire of the Committee, to the Secretary of State for the Home Department :—

18th January, 1867.

Sir,—The Society for the Encouragement of Arts, Manufactures, and Commerce, having had its attention directed to statements put forth under the authority of the Privy Council and the Poor Law Board, to the effect that the working classes of this country are insufficiently fed, has appointed a committee to inquire and report on this subject with a view to ascertain how far the existing supplies may be better utilised, and how far they may be supplemented from new sources; and from such an enquiry it seems impossible to exclude the question, how far the law is effectual to prevent or to punish the fraudulent adulteration of food and the use of false measures and weights in the sale of food.

The newspapers have lately been drawing attention to numerous convictions which are stated to have been obtained in the metropolitan parishes against publicans, butchers, bakers, grocers, and other vendors of food, for having used false weights and measures; and the Society of Arts' Committee on the Food of the People would esteem it a great favour and an important assistance in their difficult work if you would have the kindness to give directions that they may be furnished with returns showing the number of convictions that have been obtained in respect of such offences in the several parishes of the metropolis within a certain definite period (say) the year 1866. The names of the offenders are not asked for, but merely a return showing the number of the convictions, the nature of the offences, and the punishment awarded, in the several parishes of the metropolis.

I have the honour to be, sir,
Your obedient servant,
P. Le Neve Foster.
Secretary.

The Right Hon. Spencer H. Walpole, M.P., one of Her Majesty's Principal Secretaries of State.

To this the following reply has been received :—

Whitehall, March 29th, 1867.

Sir,—I am directed by Mr. Secretary Walpole to inform you, with reference to your letter of the 18th January last, that application has been made to the vestry clerks of the several parishes in the metropolis for returns of convictions in their respective parishes for using false weights and measures; and I am to transmit to you, herewith, for the information of the committee of the Society of Arts on the Food of the People, the returns which have been received from such of the vestry clerks as have not objected to furnish the information desired by the Society of Arts.

I am, Sir,
Your obedient servant,
Belmore.

The Secretary to the Society of Arts.

The returns referred to will be laid before the Committee, and the substance of them will appear in a future number of the *Journal*.

The following letter has been addressed to the Secretary of State for Foreign Affairs :—

30th March, 1867.

My Lord,—The Society of Arts has appointed a Committee on the food of the people, the particulars of which are explained by the enclosed printed paper.

The Committee are about to take up that part of their investigation which relates to the adulteration of food,

and they are anxious to learn what regulations or laws are in force under this head in other countries, and how far they are found effective; and I am directed to ask if your Lordship would, through Her Majesty's representatives abroad, procure for the use of this Committee information in illustration of the provisions, action, and effect of the laws against frauds, by adulteration, or by the use of false weights and measures in the sale of food, in France, Belgium, Holland, Switzerland, Denmark, Norway, and Sweden, Prussia, and the United States.

I have the honour to be, my Lord,
Your Lordship's most obedient servant,
P. Le Neve Foster.
Secretary.

To the Right Hon. The Lord Stanley, M.P.,
Her Majesty's Principal Secretary of
State for Foreign Affairs.

The following reply has been received:—

Foreign Office, April 2, 1867.

Sir,—I am directed by Lord Stanley to acknowledge the receipt of your letter of the 30th ultimo, and to state to you that his Lordship will be happy to instruct Her Majesty's Representatives in the countries therein designated to endeavour to procure for the use of the Society of Arts the desired information in regard to existing laws on the subject of frauds and adulteration in articles of food. I am, Sir,

Your most obedient humble servant,
G. Hammond.

P. Le Neve Foster, Esq.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture V.—Monday, April 1.

Musical Instruments.

In his fifth lecture Mr. Hullah entered on the consideration of musical instruments. He said that were he to ask any musically-cultivated member of his audience how many instruments, differing so much from one another as to have been thought worthy of different names, there was any authentic account of, he would probably answer—perhaps as many as fifty. In a list which had recently come under his eye, he (Mr. Hullah) had found that, inclusive of acoustical apparatus, the number amounted to about 400; and this list was probably not complete. This statement would hardly be so surprising as another—that all these instruments, of whatever nation, age, or material, were reducible to two—the wind instrument, and the instrument of percussion—the pipe and the string. The motion which results in what is called sound, must be communicated to the air in one of two ways—by setting in vibration either a column of enclosed air, or some other more palpable, yet still elastic body. Indeed, perhaps, in strictness of speech, there is but one instrument; for the column of air in a pipe is just as much set in vibration by percussion as is a string, a sheet of parchment, or a metal plate; but the modes of percussing a column of air, and any other elastic body, are so different as to render the common division of musical instruments indispensable. Of both divisions there are two distinct families; those in which varieties of pitch are produced by multiplication of pipes, strings, or other vibrating portions, and those in which varieties of pitch are produced from some one or more pipes (generally only one) or strings (generally more than one). Of the first family, the type among wind instruments is the mouth-organ, or pipe of Pan; and among stringed instruments, the harp. Of the second family, the type, among wind instruments, is the flute-à-bec; and amongst stringed instruments, the guitar. Pipes, as well as strings, have been made of various materials, vegetable, mineral, and even animal. Thus, pipes are made of wood, metal, crystal, and bone; and strings of flax, metal, silk, and catgut. Other instruments of percussion, of a lower type, are made of wood, dried vegetables, and skins. Before describing the modes, which were very few, of setting these instruments in vibration, Mr. Hullah would be glad to remove a very common misconception as to the causes of sound in them. The *voice* of an instrument is the air vibrating inside it, not the instrument itself, which latter simply contains and shapes the air, thereby enabling it to vibrate. The vibration causes the sound, which the instrument augments, and enables us to govern. This fact enables us to distinguish the two classes of instrument very decidedly. In many wind instruments the principal vibrating body is the air inside them, which is acted upon directly by the human breath; while, in an instrument of percussion, we have the string to set in vibration before we can move the air contained in the body of the instrument. A wind instrument has generally two constituent parts—a pipe, or sounding-board, and the air in it. A stringed instrument has three—a sounding-board, the air in it, and strings. In producing sound from a stringed instrument, therefore, we have one more step to make than in producing sound from a wind instrument; and this is one of many reasons for thinking wind instruments the more ancient of the two. But, whichever be the more ancient, both are of immense antiquity; as, indeed, are all essentially different modes of producing musical sound. A really new quality of sound has not been invented for ages. Improvements in the strength or sweetness of these qualities have been and still may be made; but, whether the oboe reed be an inch or an eighth of an inch wide, whether the flute have two holes or ten keys, the instruments are essentially the same now as they were three thousand years ago. Though no record of the order in which the primæval instruments came into being has reached us, it is not difficult to indicate what this order is likely to have been. The craving for rhythm is stronger in all of us than that for time. Monotonous sounds, iterated in an orderly manner, are more easily appreciated and remembered than sounds, in themselves more musical, whose lengths bear no proportion to one another. If this be so, monotonous or pulsile instruments must be prior to, and therefore more numerous than, all others. The number and variety of these instruments in the world is incalculable. Pipes probably followed these varieties of the drum, and pipes hardly more worthy than the drum to be called instruments. For, in its primitive state, every pipe has but one note. The production of several notes from the same pipe, like the production of several notes from the same string, was obviously posterior to the obtaining the same effect by the collocation of several pipes or strings of different dimensions. The mouth organ therefore is likely to be anterior to the typical flute, or oboe, whatever their forms may have been. The earliest stringed instrument is probably the bow; not the bow of the modern violinist, which is but a part of an instrument, but the bow of the ancient hunter and warrior. The bow-string, under favourable circumstances, gives an audible sound. The resemblance between the bow and the earliest harps certainly tends to verify the origin, not in itself improbable, thus assigned to stringed instruments. A slight thickening of the outline at one part is all that distinguishes the latter from the bow. This thickening marks the place of the sounding-board, the invention of which, like that of the line in musical notation, constitutes the first step in a long and most profitable journey. Most nations seem to have long had some instrument of the dulcimer kind, formed of strings of different length and thickness stretched over a sounding-board. These strings were sometimes plucked by the finger-nail, a quill, or a piece of ivory, sometimes they were struck by hammers held in each hand. In the former case we have the type of the harpsichord, in the latter that of its successor, the

pianoforte. Next to the sounding-board the most important invention ever applied to musical instruments was the finger-board, without which we should, to this hour, have wanted the whole family of bowed-stringed instruments. The knowledge of the division into aliquot parts of a musical string, implied in the application of the finger-board, argues a very high civilization. Such is what might seem to have been the natural order or course of discovery and improvement in musical instruments. Its probability is confirmed by history and historical monuments. Assyrian and even Greek instruments are chiefly known to us from pictorial or plastic representation; but we have not only representations of ancient Egyptian instruments, but some specimens of the instruments themselves. The Egyptian flutes which have been found are of wood; probably the earliest were made of bone. The Latin word *tibia* was applied generally to pipes not commonly made of metal. The Egyptian flutes were generally very long, and sometimes double. In Greek and Roman music, flutes played a most prominent part. They were made of box, of laurel wood, and even of brass, silver, and gold. Flutes were employed by the Greeks and Romans, not only as concert instruments, but to maintain the pitch of the voice in public oratory and theatrical representation. All recitation among the cultivated ancients would seem to have been musical. The enormous theatres, the vast public places of Greece and Rome, like the churches of the middle ages, were of dimensions altogether beyond the powers of the speaking, or so-called natural voice. Whatever associations there may now be with the monotone (the basis of musical oratory), its adoption originated in considerations thoroughly practical. All but the most practised orators, musical or unmusical, occasionally depress or elevate their voices too much; the ancients met this propensity by stationing near the orator a *tibicen*, or flute-player, who from time to time reminded him of the true oratorical pitch. In all Greek and Roman representations the tibicen plays on a double flute. It has been supposed that these instruments were often in octaves one with another; and the words *pares* and *impares*, applied by Terrence to flutes, have been thought to justify this supposition. The words *dextræ* and *sinistræ*, used by the same author, would seem to refer to the hands by which each flute was sometimes held. It is not improbable that the larger flute was one-noted (a drone), while the smaller was pierced, and capable of something like execution. The Egyptian boatmen still use a double flute; and in India there is an instrument of this class blown, not by the mouth, but by the nose. But there is another class of instrument, the pipes of which are generally of wood, like those of the flute, but the sound of which is produced in a very different way. In both the cause of sound is the vibration of the column of air contained in the pipe, but whereas the tone of flute pipes is produced by a comparatively direct action of the breath on this column of air, that of reed-pipes, as they are called, demands the intermediate agency of a tongue, or a pair of tongues, of some elastic material, the vibration and beating together of which afterwards sets the column of air in the pipe in vibration. That which a string is to a sounding-board a reed is to a pipe. Dr. Burney, writing in the last century, thought that the ancients were unacquainted with the reed; but in some pipes from Egypt, in the British Museum, there are pieces of thick straw, or similar material, which a recent writer, Mr. Engel, thinks served for a similar purpose as the so-called reed in our oboe or clarionet. Indeed it is difficult to understand how, without a reed, a tube blown from the end, in the manner depicted on ancient monuments, could be made to sound. Of brass instruments, the type, the trumpet, is very ancient. As flutes, generally of wood, were sometimes made of metal, so trumpets, generally of brass, were sometimes made of other material. Hebrew trumpets, for instance, were rams' horns. The oldest representations give the trumpet, not as with us, doubly reversed, but straight, or very slightly curved. In processions trumpets thus made, being too heavy for the performer to support, were rested on the shoulders of other persons, and in stationary performances on a frame. There are three modes of setting in vibration a musical string, and the result of each is the production, even from the same string, of very different qualities of sound. These modes are plucking or pulling it with the finger, the finger-nail, a quill or a piece of bone; striking it with some kind of hammer; and abrading or rubbing it with a bow. With the first two of these modes the ancients were acquainted; of the bow it is probable that they had no knowledge; it is certain that they did not turn it to account. Of the plucked instruments the types are the harp, and the cithara or guitar. The lyre, though different in form from the harp, is but a variety of it. The cithara, identical in principle, and even name, with the guitar, is a very different instrument from the harp or lyre; and though, in the hands of the ancients who did not use the bow, it remained very inferior to the harp, yet its construction indicates greater mathematical science if not greater mechanical skill, and an admirable economy of means and appliances. Moreover its finger board was in very early times, it is believed, *fretted*; showing that the harmonic division of a string was understood. But it is as the founder of the violin-family that the cithara is most interesting to us. Many were the modifications needed to develope the cithara into the violin, yet no one would for a moment question their relationship. The harp, however, as it was the most perfect, was the most honoured of very ancient instruments. Numerous representations, both of Assyrian and Egyptian harps, have been found; and they, the latter especially, argue not only great mechanical skill and considerable musical science, but the power of producing music which it is likely might have been considered pleasing and effective even by us Europeans of the nineteenth century. Not so with the Greeks, who never adopted the harp. The trigonon, an inferior harp, and the lyre, were in use among them; but, with a single possible exception, there is not a Greek monument extant including any representation of a harp. What sort of music, in our sense of the word, could have been got out of the lyre it is not difficult to imagine. But the music of the Greeks was altogether another art from ours. They, of course, originally received all their arts from nations older in civilization than themselves, and their aim and object would seem always to have been to simplify them. The same craving for what is called the chaste in art, which led the Greeks to the substitution of the lintel for the arch, and the repetition of the severe forms with which we are all so familiar for the intricate outlines and variegated surfaces of Asiatic architecture, would naturally induce the rejection, as barbarous, of an art so nearly akin to these latter—poliphonic or part-music. The lyre is not of Greek invention; it was known both in Assyria and Egypt. Of instruments known to us chiefly through representations, it is not extraordinary that we should have recovered little about the musical construction or methods of tuning. Mr. Carl Engel, to whose works on ancient music Mr. Hullah had more than once referred, has made some ingenious suggestions on this subject. He thinks that many ancient instruments were tuned to a scale of only five sounds; and his conjecture is supported by the fact that many do consist only of five, or twice or thrice five strings. The "instrument of ten strings" of our translation of the Psalms of David will of course come into everyone's recollection. Seven strings, the number found in some ancient instruments, might have been tuned very efficiently in the Greek order of *conjunct* tetrachords. No succession of so few sounds as the last could possibly be contrived out of which such a variety of agreeable melody can be got. The presence of the lower leading note gives it a great advantage over our scale, while the absence of the tritone makes it much easier to sing. Moreover, it includes the third from the tonic (as we should call it), which decides its mode as

major. A great number of popular tunes are contained within the compass of two conjunct Greek tetrachords, among them our National Anthem. The lecture was illustrated by a large number of drawings of ancient instruments, and some specimens of oriental reed pipes.

SEVENTEENTH ORDINARY MEETING.

Wednesday, April 3rd, 1867; The Earl of SHAFTESBURY, K.G., in the Chair.

The following candidates were proposed for election as members of the Society:—

Brown, Thomas P., 24, Surrey-street, Strand, W.C.
Despointes, F., 11, St. Luke's-road, Westbourne-park, W.
Jones, Sir Willoughby, Bart., Cranmer-hall, Fakenham.
Roe, Charles Wm., Padmore-villa, Sunny-bank, South Norwood, S., and 37, Moorgate-street, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

Folliott, William, 12, Idmiston-villas, Forest-gate, S.E.
Lewis, R., 18, St. James's-street, S.W.
McCall, J., C.E., 137, Houndsditch, N.E.

The subject introduced for discussion was—

SUGGESTIONS FOR A MODE OF SUPPLYING CHEAP AND HEALTHY DWELLINGS FOR THE WORKING CLASSES, WITH SECURITY AND PROFIT TO THE INVESTOR.

BY THOS. HAWKSLEY, ESQ., M.D., LOND.

Before describing the method of providing suitable dwellings for the working classes which I am desirous of submitting to your consideration, I will beg to premise, as briefly as possible, a few observations on what appear to me the faults of our system in dealing with the requirements of the poor, and I regret that the time usually allotted to communications of this kind will not allow me to refer much to the authorities and the exact data on which my argument is founded.

We know that a considerable portion of the community in our country suffers under the difficulties of poverty, difficulties connected with bad and to them expensive dwelling accommodation, dear and adulterated food, impure water, foul air, insufficient clothing, firing, and want of education. To the persons so circumstanced life is a struggle from birth to death. In the conflict, from 17 to 27 per cent. of their infants perish within the first few months of their introduction to a world to them so hard and cruel. The children who survive these first rude assaults grow up pale, weak, and old before they are young, so little do they see of the play and sunshine appropriate to infant years. Many die early of scrofula or consumption, or, if they become men and women, they die on an average at half the age of others, having in that time lived the life of drudges, amid the unwholesome and wretched conditions that support and propagate the long list of preventible diseases.

A careful study of the census tables under the heads of the occupations of the people gives a strong support to the belief that, while the educated and trained members of the community are as one only, the numbers of the uneducated and the ill-trained are as many, at least, as three; so that, in a population of 20 millions, there are three-fourths, or 15 millions, predisposed, for want of the protection and the aid afforded by education and training, to gravitate into that substratum of society—the poor, or the pauper class. We know that the numbers of the latter, or pauper class, are equal to $\frac{1}{20}$th of the whole community; and, judging from the distress in the east of London and elsewhere whenever some unusual strain is put on the poorer population by pestilence, disturbed industry, or severe weather—(on the last occasion—the frost in January—in the east of London alone, 100,000 sufferers were relieved); judging, also, from the ascertained fact that, of every seven or eight deaths occurring in London, one takes place on a bed provided by charity; and again, from the enormous machinery employed to relieve poverty, which in the metropolis distributes some two millions sterling for the relief of the bodily wants of the poor, irrespective of the amounts employed in education and religion in their behalf, and independent, too, of the £900,000 and upwards expended from the poor-rates; judging from these evidences, there can be no doubt that, at least, three or four of the poor exist to every completed pauper. Some of those best qualified to judge believe that in the metropolis there are half a million of poor, struggling between pauperism and self-dependence.

If we ask what evil influences are at work to produce and maintain this large amount of misery and destitution in the midst of the richest and most humane people (judging by their charities) in the world, the reply must be that it proceeds from two principal sources: the first is ignorance, or the want of that education and training which make men and women competent and valuable to their employers, in consequence of which the rewards of their labour—their wages—are much less than they might be, and also the ignorance which leads them to adopt bad hygienic management, and to prepare their food badly and wastefully. The second great sources of evil to them are the conditions so unfavourable to health by which they are surrounded, and to which their poverty binds them helplessly—the crowded, unhealthy, and wretched character of the only dwellings they can get, with their deficient light, their bad drainage, and the decomposing filth within or around them—conditions which afford the necessary elements for the germination, the growth, and the propagation of the preventible diseases, such as typhus, typhoid, relapsing and remittent fevers, scarlatina, measles, cholera, and, from the lowered vitality produced by such dwellings, scrofula and consumption.

It should be known by those whose happier state in life preserves them from these unwholesome conditions, which act as fever-nests and hotbeds for nursing those preventible diseases, that the seeds of these diseases thus abundantly produced steal beyond the locality of their production, and enter the comfortable houses of the middle classes and the mansions of the rich, where, though they find fewer victims, they are wont to deal more deadly influence on those they find, as if the constitutions unused to the destructive influence of poisonous agents felt them more than those constitutions which had established a degree of tolerance—just as it is found that chloroform is often more deadly to the healthy than the diseased. And surely, when we mourn the loss of some valuable life in the upper or middle classes, cut off by one of those diseases, which had its origin in neglect and indifference to the sanitary conditions of the poor, we may feel it to be like the stroke of an avenging Providence.

Thus we find that a variety of the most powerful arguments combine to demand—not only on the ground of prudence and foresight, but also on that of common humanity, and of solemn responsibility before God, that we should remove these heavy burdens from the poor, and give to them a fair field for the fulfilment of their duties.

We have seen that, almost fabulous in amount as are the charities of England, and of the metropolis in particular; necessary and good in their way as are our workhouses, hospitals, asylums, and relief associations; after all they only *relieve* the evils of pauperism and destitution *after* the fact—they cannot and do not in any way come *before* and *prevent* those evils. Their increased number and extent are, in fact, a measure of the increased and increasing evil of pauperism, and their employment under a right system should be looked upon as a temporary palliative, while the true and really useful work of *preventing* pauperism is getting into operation,

and producing its fruits. Every student of human nature knows that before a man can accept alms and doles, his self-respect and self-help are gone, and he is apt to become the careless, idle, servile, and hypocritical object so extensively produced by our workhouse system.

On the other hand, if we adopt a system that does not pauperize, but treats the poor man with respect, and simply makes it possible that the wages of his honest labour shall be able to command the decent and comfortable requirements of life—that his home may be bright and cheerful, and not so wretched that perforce he is driven to the public-house—that the health of himself and family is not so constantly oppressed by heaviness, langour, and weakness, that all hope and enterprise are taken out of him, and that, instead, he is able to look forward hopefully, and to be possessed of an incentive to progress—that his children can be educated and trained by means at his command, and that he is not obliged to leave them to run wild in the streets, to become thieves and vagabonds—then we may hope to find, year by year, that our poor rates are reduced in amount, our workhouses less and less occupied, the mortality and sickness much diminished, and the general prosperity and happiness increased.

In the laws of nature, all things work together for good, and nowhere do we find an example of a law designed to accomplish some useful end counteracting its intention by producing in its action some other evil. It is the same with really wise human laws; the only proof that they are so is to be found in the fact that they move harmoniously with the general good, and in repairing one injustice do not make another.

In the instance before us, we desire to relieve our suffering fellow-creatures from the oppression of diseases which afflict them ten times more than the rest of the community;* and we are anxious to know that the habitations they can afford to rent are fit for human beings to live in.

To obtain these results on one system of management,—that of *relief*—we expend in the metropolis alone, in all probability, at least three millions per annum, independently of the immense sums given in private charity; but we have made no advance. The *Times*, in a leading article in last January, says, "To any one who was ignorant of the organization of the metropolis, it would seem as if there was no provision whatever for the relief of the London poor."

Dr. Farr, in the supplement to the 25th annual report of the Registrar-General, 1864, says that the loss of life in 30 large town districts, comprising St. Giles's, East London, St. George's-in-the-East, St. Saviour's, St. Olave's, and St. George's, Southwark, and others mentioned, equalled on an average in the ten years, 1851—60, 71,194 annually; but the proper number for the same population in a healthy district would have been only 38,459. There was consequently in these 30 districts an annual sacrifice of life amounting to 32,735; which, as Dr. Farr says, "may be justly ascribed to the unfavourable sanitary conditions in which the people live and die."

In the same supplement, Dr. Farr says that at the age from 45 to 55, the mortality of London men is double that of men in the healthy districts.

These impressive facts enable us to understand the enormous pecuniary cost sustained in England by the loss of labour and the sickness from preventible diseases. That cost has been estimated for England and Wales, to be equivalent to over thirty-two millions sterling per annum, and for the metropolis alone to nearly five millions per annum.

By another system, that of prevention, by removing the causes of preventible disease and by education, we may find that we not only attain our ends and cure the destitution and misery that are so wide spread and so injurious to all classes, but we may find that the system is self-supporting, and that in this instance as in others, *the right method is inexpensive, and the wrong one very costly.*

The great evil of unfit and insufficient habitations for the poor and labouring classes, has been greatly on the increase of late years, and now, from the railways advancing their termini into the centre of the metropolis, the formation of metropolitan railways, and the taking up new ground for other public improvements, as for the building of the law courts, the difficulties have been immensely increased. Within the last quarter of a century, several associations and individuals actuated by a noble philantrophy have stood forward to do battle with this great cause of wrong and oppression.

The first on the list is the Metropolitan Association for improving the Dwellings of the Industrial Classes, offices, 19, Coleman-street, City. This institution was founded in 1841. From its last report we learn that it has ten metropolitan establishments, which lodge a population of 2,572 persons. The average mortality of this population was a fraction over 17 per thousand. The dividend for distribution to the shareholders after paying all demands and providing for all contingencies, was 3½ per cent.

The second is the Association for Improving the Condition of the Labouring Classes; offices, 21 and 22, Exeter Hall. This was founded in 1844, and has pursued a very active and useful career. It now lodges about 1,625 persons in eight London establishments. The mortality in this population for the last four years, like the former, has been a fraction over 17 per thousand. The dividend divisible as net profit on the dwellings (separating the baths and wash-houses from the calculation) is 5 per cent.

The third association is the London Labourers' Dwellings Society; offices, 3, Charlotte-row, Mansion-house. This has paid 5 per cent. from its formation, after setting apart a sum sufficient to provide for the redemption of the leasehold property. Particulars are not given in the report received of the population or rate of mortality.

The fourth is the Improved Industrial Dwellings Company, limited; offices, Carpenters' Hall, London Wall. From the experience of its working up to the present time, the directors believe that a minimum dividend of 5 per cent. per annum may be relied upon.

The fifth are the houses erected by Mr. W. E. Hilliard, in one of the worst districts in London, that of Shadwell. Mr. Hilliard first built twenty houses on this property, on the general plan of the model cottages of the late Prince Consort. Each house containing four dwellings, cost £487 to build. After an allowance for ground rent and all other expenses, the return has yielded a clear 6 per cent. per annum; and so satisfactory were the whole results that Mr. Hilliard determined to build more of these houses sufficient to accommodate 108 families.

There are also the model buildings erected by the late Prince Consort, those of the great Peabody benefaction, and others by Miss Burdett Coutts, all of which have been erected with less regard to any commercial success than to the purely benevolent one, and therefore they do not furnish the same kind of experience on that head. But from all, we learn the same reports of improved health and morals, and of diminished mortality.

Mr. Glover, the Superintending Medical Inspector of the General Board of Health, in his report, dated January 20th, 1855, says:—"Some of these (Mr. Hilliard's) houses have been occupied nearly three years, and the average population during that period has been 450. Among this number of inhabitants, congregated in one of the worst localities of the metropolis, a large portion of them being children, it is gratifying to find that there

* Of upwards of 18,000 deaths from cholera which occurred in London, in 1849, it was found that they were in the following relative proportions:—

Of the gentry	2·6	per cent.
„ tradesmen	15·7	„
„ mechanics	81·7	„

has been a considerable diminution, if not an almost total absence, of epidemic* disease. There has not been a single death from cholera or diarrhœa in any of the houses." Again, he says:—"The erection of these Albert-cottages, provided with arrangements essential to health, comfort, and morals, is producing the happiest results in the neighbourhood. Tenants have become sensible of the discomfort and evils of their unwholesome dwellings."

Mr. Henry Roberts,† speaking of the model lodgings and dwellings generally, says:—"But not only has the improvement in the physical condition of the occupants of these houses answered the most sanguine expectations of their founders, but it is still more gratifying to know that moral improvement has been made. The intemperate have become sober, and the disorderly well-conducted, since their residence in these healthful and peaceful abodes. No charge of crime, nor complaint of disturbance, has been lodged at any police-station against a resident in these dwellings. The neighbourhood in which many of the houses are situated has also participated in their ameliorating influence. They appear to act as silent monitors, reproving disorder and encouraging cleanliness and propriety."

The superintendent of one of the establishments says:—"The nocturnal uproars in the adjoining streets, which constantly disturbed the inmates when first the houses were opened, gradually diminished, and finally ceased altogether."

The diminution in the rate of mortality in these improved dwellings is much greater than might have been expected, when we consider that the real difference is not as 17 to 24 (the ordinary general rate of the metropolis), but, seeing that the diminished rate has occurred amidst the most unhealthy parts of the town, the difference cannot be less than that of 17 to 33. This saving of life implies much. It tells us of increased fitness for work and exertion, of hours and days saved from suffering and from loss.

> "Dread to the poor the least suspense of health,
> Their hands their friends, their labour all their wealth.
> Let the wheel rest from toil a single sun,
> And all the humble clockwork is undone.
> The custom lost, the drain upon the hoard,
> The debt that sweeps the fragment from the board.
> How mark the hunger round thee, and be brave!
> Foresee thy orphans, and not fear the grave!"

It tells of much pain and anguish prevented, of many children preserved to fulfil the purposes of their being; of parents saved to be their guardians and protectors! It tells of a small portion saved of that four or five millions of money wasted in the metropolis by the existence of so much preventible disease. God speed therefore the noble work of the philanthropists and patriots who manage these invaluable institutions; they merit the gratitude of their country as the pioneers of the most pressing and important reform affecting the welfare of the bulk of the people; and not only for what they have effected, but for what they have taught us.

Unfortunately, great and valuable as the amount of work done by them is, it is but a very small portion of that which remains. There are, possibly, eight or ten thousand poor well lodged in these improved dwellings; but the lowest estimate indicates that improved dwellings are wanted for 200,000 persons at least, and it is not likely that these associations will be able either to provide for so many, or to provide them on a scale sufficiently cheap for the poor, and yet sufficiently remunerative to the public to attract the investment of money for the purpose. The Prince Consort said to Mr. Henry Roberts, the honorary architect of the Association for Improving the Condition of the Labouring Classes, "Mr. Roberts, unless we can get seven or eight per cent., we shall not succeed in inducing builders to invest their capital in such houses." This observation exactly hits the truth; as a commercial speculation the work would not spread and be successful with only five or six per cent. returns.

Another obstacle that opposes their success, is the difficulty of obtaining the property which, by its unfitness, has become a source of evil, and which it is necessary to improve or to clear away, and replace by suitable dwellings. Such property is often possessed by persons who have no regard for their fellow-men, and consider only the money to be screwed out of them, by providing them with lodgings which cost little or nothing to keep in order, and for which they obtain the same rent as those supplied by the associations, with every comfort. By this unprincipled course, such property may pay from 20 to 30 per cent., and by the humane and honest one only 5 or 6. It is not wonderful, therefore, that great opposition is often experienced in effecting the reforms necessary.

The societies have also experienced difficulties, for example, in being able to obtain only one side of a street, when the improvements would be impracticable without possessing both sides. Sometimes the property was in Chancery; or it was held by a number of persons; or unprincipled solicitors would put in every obstruction to proof of title and of sale, in order to increase costs. Sometimes the property was entailed, and burdened with a complication of claims; or part was held by some one abroad, or supposed to be dead; or the societies were met by disreputable owners with an almost vindictive demand for such outrageous prices, as made all dealing hopeless.

The Society for the Improvement of the Condition of the Labouring Classes has, in these ways, had to pay heavily for some of the property they purchased. The consequence is that the Streatham-street establishment costs £38 a head of population; the Portpool-lane, £54 a head; and the George-street lodging, £61 a head. On these conditions it is not likely that dwellings for the poor can be built to pay the 7 or 8 per cent. necessary to attract investors. Notwithstanding, this association has been able to supply some of its single rooms to the poor at as low a rental as 1s. 6d. a week, with the other results named.

Mr. McCullagh Torrens, the member for Finsbury, has just carried through its second reading a Bill, the intention of which it is impossible to praise too highly; the only questions concerning it are whether the mode it prescribes for enforcing the improvement or the rebuilding of the condemned property might be simplified and made more effectual; and whether the mode of providing the means to carry out the work might not be placed on a larger and more expansive basis.

The mode of acquiring the property, or of enforcing its improvement, under Mr. Torrens's Bill, would appear to be unnecessarily indirect and troublesome. There is

1st. The report of the officer of health, who is a parish officer, and who, failing to initiate proceedings may be called upon to do so by four householders.

2nd. The officer of health has to deliver copies of his Report to the clerk of local authority and to the clerk of Peace.

3rd. The clerk of local authority is to lay his report before the council.

4th. The clerk of the peace is to do the same before the grand jury, who will make a presentment.

5th. The clerk of the peace is to send a certified copy of his presentment from the grand jury to the clerk of the local authority.

6th. The local authority thus advised of the grand Jury's presentment, prepares plans and specifications of the required works, and the clerk gives notice to the owner of the property of the grand jury's presentment.

7th. Against this presentment the owner may appeal within 14 days.

8th. Or the owner may within three calendar months elect to do the work required, or to require the local authority to purchase the property.

* Epidemic diseases are among the preventible class.

† Vide "The Physical Condition of the Labouring Classes," by Henry Roberts, F.S.A., 21, Exeter Hall.

9th. In the latter case, if the parties do not agree between themselves as to the bargain, the local authority having delivered to the owner the valuation made by two able practical surveyers, then, if within a month of the receipt of such valuation the owner have not signified his intention to accept it, the local authority shall pay in the amount of the tender in the manner prescribed by the Land Clauses Act of 1845, and the local authority shall be at liberty to proceed with the work of improvement or demolition, as the requirements of the case may be.

10th. The property thus acquired by the local authority shall be held by it in trust for the purpose of—

a. The providing the labouring classes with suitable dwellings, by the construction of new ones, or the improvement of existing ones.

b. The opening out of closed, or partially closed, alleys or courts.

11th. Lastly, the local authority shall not possess this trust on any given property longer than for 7 years, and if during that 7 years it fails to sell, exchange, lease, or otherwise dispose of it, at the end of that time it shall escheat to the Crown in the same manner as if it were land belonging to a corporation which had no power to hold the same.

Now in a work of this kind, in which philanthropy and high principle have to take the place of personal interests, it is very desirable that the persons undertaking the trouble should be exposed to as few vexations and prolonged contests as possible; and it would also seem necessary to have the business transacted by persons and officers in a position as regards parish interests independent and impartial. The persons who most interest themselves in parish and vestry management are often personally interested in property of which the general good demands the reform.

1. The mode of acquiring the condemned property or of enforcing the improvement of it, would be rendered much more easy and effective by leaving the associations who would effect the work to obtain information of unfit premises or localities from all informants, not of course excluding the officer of health, but rather attaching the greatest importance to his information.

2. After the information received, the association should delegate its own officer to visit the place, who with the assistance of the officer of health would get up the accurate facts, and then report to his Board.

3. The association, having concluded that the case demands interference, draws up its statement, estimates, cost, &c., and then,

4. Sends a copy of its presentment to the owner of the property, and another to the Government officer appointed to control the associations.

5. The government controller not intervening, and thereby assenting to the justice of the presentment, the association next endeavours to make terms with the owner of the property for the fulfilment of the requisite improvements, and the owner objecting to come into the undertaking, the association then cites him to appear before the justice of the peace, or the tribunal appointed to try such cases, and thus all dispute might be summarily settled according to the rules of law and equity, in conformity with the Lands Clauses Act,

This method would probably save trouble and expense to all parties. It would require no parish rate to be imposed for carrying it out, and all the funds for every expense would form a part of the outlay of the associations, as they now do. The work would be pursued with a single eye to the public good without the impediments of local influence; and this mode would be specially advantageous as obviating the necessity of selling the property within seven years, and so avoiding the risk of its falling back into the bad state and management of its previous owner.

The following conditions are laid down as necessary:—

1. The removal of all the existing foci of disease, and the unsuitable poor dwellings, and their replacement by healthy ones appropriate for artizans and labourers. The improvement of those dwellings that do not require demolition, and the opening out closed courts and confined spaces.*

2. That the rent to be paid by the occupiers of the proposed dwellings shall be on a scale adapted to the requirements of the humblest artizan or labourer, and on the other hand that the net profits on the general undertaking, shall secure a minimum five per cent. dividend on the capital paid up.

The first condition will require for its fulfilment a large sum of money. If Mr. Torrens' estimate of one million sterling for 35,000 habitations be correct, which is about £28 10s. a head, it must require at least seven millions to build dwellings for the smallest number believed to require them? Does it not seem better that the supply of means should be of an elastic character, capable of accommodating itself to the requirements, whatever they may prove to be, rather than to shut up the work in a defined and inadequate sum? But as the work will not pay the highest interest necessary to attract this capital as an *ordinary* adventure, (the 7 or 8 per cent. laid down by the Prince Consort) what is required is to make it so desirable that some of the immense wealth of this country, waiting for investment, may be attracted to it. It is presumed that if the government would guarantee a minimum of 4 per cent. interest on such investments, the object would be immediately attained. To the public desiring a safe investment for their money it would be a great boon, for their property would be as safe as in Consols; and while tolerably certain to receive an interest of not less than 5 per cent., the government would be responsible for the minimum of 4 per cent. The debenture certificates of the associations would be easily negociable; and there can be no doubt that, in these days of commercial imposture and dishonesty, the demand for such a safe and desirable mode of investment would be greater than the supply. But what objections might the government be supposed to interpose? As to want of precedent, it may be replied that in India, the government has thought fit to guarantee the railways. In England, if there be no precedent, it may be replied that in this instance, the claims for the boon demanded are so important and peculiar, that compliance with them is not likely to be dragged into a precedent for any object. The importance consists, as before-mentioned, in its being necessary to prevent death, disease, and misery, to an immense portion of the community, and damaged health and prosperity to all. The peculiarity is this, that in granting the boon the government accepts no risk. Every shilling of the money subscribed by the public would be invested in houses and land, the natural tendency of which is to increase in value, and which in themselves constitute the safest property in existence. The property would be managed by associations of gentlemen undertaking the work from the highest and most disinterested motives; government officers would be associated, who would be responsible to the government for the probity and the prudence of the management, and lastly, a net profit on the undertaking of not less than 5 per cent. per annum, would be insured by the following plans to be discussed under the second condition.

This second condition requires that the dwellings should be let at a rent that the humblest labourer can pay, and yet that the whole undertaking should return a profit of at least five per cent. after satisfying all claims.

Until the working classes become more prosperous by a diminution in the oppression and misery caused by

* It is not supposed or intended that the whole of condemned London is to be pulled down and rebuilt at the same time. The associations would take care that everywhere the convenience of the poor should be studied, and the work, though commenced on an extensive and comprehensive scale, would be so diffused and managed, that from the first increased instead of diminished accommodation would be provided.

preventible disease, it would seem that a very large *majority* of them, at the present rents, can afford to pay for one room only. Even in the rich parish of St. George's, Hanover-square, we learn from Professor Kerr's paper, read before the Institute of British Architects, that of 1,500 abodes of the poor visited in that parish, it was found that 8½ per cent. of the families only had three rooms, 28½ per cent. had two rooms, and 63 persons had one room only. In the poor parishes the inability to pay rent is greater still; and it would appear that the provision should be, that the rooms being built in compliance with the requirements of health and comfort, comprising the proper allowance of light, ventilation, water-supply, and other conveniences, the rent per room should be from 1s. 6d. to 2s. and 2s. 6d. a week. This scale, it is believed, would provide for the wants of the poorest individual or family; and there can be no doubt, with the improving action of these dwellings on the health and morals of their occupants, that very soon each family would be able to pay for three or four rooms, and in the first instance for two.

The other feature of this second condition—that the undertakings should return a clear profit of five per cent. at least on capital, is made clearly practicable by the following features of the plan:—

1st. The purchase of the property to be by *compulsory sale* and reference to an *equitable tribunal*. By this means extortionate prices would be saved, and the greatest difficulty in building for the poor cheaply would be avoided.

2nd. Advantage would be taken of the valuable experience obtained by the pioneers on the road, both in the form and arrangement of such buildings and in the materials used in their construction. For example, the architect of Mr. Alderman Waterlow's buildings (Mr. Allen) discovered a material which combines cheapness, durability, ornament, and economy of labour, and this has enabled him to erect the buildings for "The Improved Industrial Dwellings Company" at much less than the ordinary cost. Probably substitutes for brick and stone may be made cheaply on the same principle, wherever shingle can be had without much cost.

It may be found advantageous to vary the form and arrangement of the buildings according to the requirements of the neighbourhood; and it is suggested that not only would it be found profitable in some situations to make the basements into shops, as has been done in Mr. Waterlow's houses, but also that in others it might be found to pay well to convert the flat solid roof into workshops and warehouses for the use of the tradesmen in the neighbourhood, who would be able to pay a good rent for them, and so lighten the rental of the dwellings.

The writer believes that a time is coming when the refuse of houses, now so mismanaged that it is the principal cause of preventible diseases, and is also a great expense to remove—will, by good management, become a source of profit, and, at the same time, by saving the water now used in washing it into the sea, that water may then be supplied by the water companies in a continuous supply, so that the expense of cisterns and other apparatus for storing water may be done away with.

These instances are merely given as examples of the many ways in which expense may be saved in building these dwellings, and, at the same time, improving their healthfulness and comfort, and, taken in connexion with the experience of the society of which Lord Shaftesbury is the chief, that of which Lord Stanley and Alderman Waterlow are chiefs, that of Mr. Hilliard, and the London Labourers' Dwelling Society, it may be confidently affirmed that the conditions laid down for fulfilling all the requirements of these dwellings may be perfectly realised, and a profit of at least 5 per cent. secured, after satisfying all charges and contingencies. Thus the Government is called upon to give only the ægis of its protection and security to this great national and all-important work; and while accepting no risk or expense, it would confer immense benefits on the whole community as regards its prosperity, health, and morality.

In conclusion, allow me, very briefly, to sum up the positions I wish to establish. They are:—

1. That a very considerable portion of the population in this country is exposed to the risks and penalties of preventible disease, and in a degree most unequal and unjust as to the rest of the community. Also that the portion of the population referred to is constituted of the persons throughout the land who, from their ignorance and their poverty, are quite incapable of rectifying their position without the assistance of their less-oppressed fellow-countrymen.

2. That Government and society, having always recognised the duty of assistance, have generally adopted one of two systems for its fulfilment, both of which deal only with the results and effects of the evils referred to, and leave their fountain or causes unopposed. The two systems are either that of *relief*, as of visiting the sick, feeding the hungry, and clothing the naked; or that of *repression*, as by making parochial relief and workhouse management so hard and painful that none but those driven to a last resource, or whose spirit had been broken by previous experiences of their degrading influence, would apply for their aid. Of the same repressing character is an enactment which would drive out poor wretches from over-crowded lodgings, without at the same time providing better ones.

3. That these systems of dealing with the evils referred to are very costly, it having been calculated that the preventible diseases involve a loss to the country of over thirty millions sterling a year, and the relief of their destructive effects cannot be less than another cost of fifteen millions per annum.

4. That the system of *prevention* is inexpensive, for it not only diminishes more and more the production of the evils referred to, but the machinery employed in the work is, for the most part, self-supporting. Its spring of action is not the charity that gives money to relieve suffering, excellent and necessary as that is where the suffering exists; but it is the higher and broader charity which recognises in every human form a nature precious as our own in God's sight, and which would shrink from moulding that nature into the pitiable and degraded form of the pauper, but rather would treat it with respect, and seek to elevate it, by making it possible that the wages of honest labour may be able to procure the requirements of life under the conditions of health and decency.

5. That the want of a sufficient number of healthy dwellings, at a rental practicable to artizans and labourers, having been shown to be the chief cause of these evils, the principal work of the preventive system is to supply them.

6. That the associations now at work for this purpose afford a ready, convenient, and inexpensive machinery for carrying out the object to a successful issue. The results of their operations as seen in the improved prosperity, character, and in the diminished mortality of the population for whom they have found healthy dwellings, prove the correctness of their method; while the independence of the plan of parish rates, parish interference, and all new burdens, recommends it for simplicity and efficiency.

7. That this machinery, to be successful, requires two helps from Government:—

a. The compulsory power of purchasing property which can be proved to be a public nuisance, and a source of disease and immorality, but which the owner thereof neglects or refuses to improve.

b. The grant of a guarantee by the Government to the public investing in this useful and patriotic work, to the effect that a minimum interest of 4 per cent. per annum shall be its perpetual condition.

The question has long been an anxious one to the

writer, who, as physician to one of our public infirmaries for consumption, has had great practical experience of the destructive and degrading influences on body and mind of the unfit dwellings of the labouring classes, and he hails with thankfulness the good step taken by Mr. McCullagh Torrens. He hopes, however, that the suggestions herein offered may receive a thoughtful and serious consideration, with a view to the modification of Mr. Torrens' Bill in order to meet them.

DISCUSSION.

Mr. Edwin Chadwick, C.B., said that, at a time when large extensions were contemplated of healthy homes for the labouring classes, it was proper to call attention to the fact that the common constructions were not healthy to the extent that was practicable. The improvements in the removal of the sewage, and of the decaying animal and vegetable matter, were now pretty well understood, and sometimes sufficiently well accomplished, with the result of the reduction of the sickness and death-rates by one-third in common constructions. But another important desideratum was to prevent damp and foul deposit, and the retention of noxious miasma, and to ensure complete dryness and purity in the common wall. On occasions of extraordinary epidemics, all experience showed how long fœtid and noxious smells were retained by absorbent walls. In cases where the authorities had been prevented by obstinate landlords, or other causes, from properly cleansing and scraping such walls, when, after a time, new inmates occupied the premises, it was observed that, in the houses that had been successfully defended against the wall cleansing, and in those alone, fever had broken out again amongst the new occupiers, thus demonstrating the deleterious influence of the foul absorbent walls. In hospitals, where the cleansing of the walls had been too long neglected, instances occurred where every man engaged in scraping and cleansing them had been made ill. With such experience it had become a sanitary rule of hospital construction that the walls should be constructed with a non-absorbent and readily washable surface, and this sanitary rule ought to be universal as a principle of construction for common habitations. The common lath-and-plaster constructions—the laths which rotted, and paper which harboured vermin—were unwholesome. The common wall constructions were, moreover, objectionable from their tendency to absorb damp. Every common brick in lower-class dwellings absorbed a pound of water, and thus a two-storied cottage, when completely saturated with moisture, would absorb as much as six hundred gallons. To protect the inmates from driving wet, expensive slate coverings were often resorted to. But it was not alone the driving wet, but the wet rising from the ground, carried up by capillary attraction, in these walls of absorbent, spongy stone, as well as of brick, that had to be guarded against. The evaporation of the excessive wet lowered temperature, and the chills thus caused frequently induced the use of stimulants. Damp lowered the bodily condition, and rendered it more susceptible to disease. Numerous cases of rheumatism, so common in the country, were due to the damp of the walls of the cottages in which the people lived rather than to the wet of the fields in which they worked. But the evil was not confined to the lower class of houses. The damp material, of which better class houses were constructed, rendered them unsafe to inhabit for nine or twelve months after their construction, when they had undergone some degree of drying. A row of newly-constructed middle-class houses was sure to be the seat of an extra amount of sickness immediately after their first occupation, as medical men were well aware. For the prevention of this species of evil, he had some time ago imagined and endeavoured to promote wall constructions with hollow hard-burnt non-absorbent vitreous bricks. Houses might thus be built so that they might be safely occupied at once. Walls of the common material, though cheap to construct, were certainly dear to use. But if the hollow bricks were made of a large size, hollow pots in fact, they were cheaper to construct. The obstacles to their introduction had been that they required special and large machinery for their production, and an alteration of trade habits of construction. Plans and estimates had been prepared at his instance, by Mr. Robert Rawlinson, and these having been submitted to an eminent builder, his estimates showed an economy of 20 per cent. On the builder being asked whether this form of construction was practicable, he had said "Yes," but when asked, "Will you adopt them?" he had said, "No, I will not; because this large form of brick will require two hands to use them, and my men will strike when I attempt to introduce it. Thus there will be a great deal of trouble in altering the present practice and habits of construction; and when I have done it all, and proved the economy of the work, other builders will profit by my experience, and build as cheaply as myself. I shall have all the trouble of the change, and I shall have no profit from it, so I will not undertake it." Other large firms took the same view, and so improvement was stopped. Hollow bricks of the common form, and somewhat less absorbent, had been got into occasional use, but a complete reform of the present deleterious principles of construction had yet to be accomplished. The late Capt. Fowke had directed his attention to some forms of concrete, as an improvement upon the common brick construction, and had had some preliminary trials made with concrete made of Portland cement and of Scott's cement, which showed that the concrete was not from one-third to one-fifth so absorbent as common brick, and might receive an almost perfectly non-absorbent and washable interior facing, which was a great desideratum. The material, sand or gravel, or breakable stone, or the slag of furnaces, was procurable everywhere. There was a lodge of concrete, and walling of concrete, at the South Kensington Museum. He had seen some cottages on the Marquis of Salisbury's estate at Hatfield, where he had built a church and a farmery, and where a park had been walled with concrete. The occupiers of the cottages and the farmer attested the dryness of the walling, which was the essential sanitary point, and as to the economical question, the cost was about half that of brickwork. In cottage constructions, half the expense was the walling and other parts now made of brickwork. Now, if this half was reduced one-half in cost, if $5\frac{1}{2}$ per cent., were gained by the common constructions, seven per cent. or more appeared to be attainable by this new form of construction, almost anywhere, even without new or costly machinery for "pot" manufacture, for which we should have to wait. He considered that trial works of new materials were now a great desideratum.

Mr. Hawes confessed, when he read the title of the paper, he expected to hear something new about the cost and construction of cottages, whereas the author had not spoken of any improved modes of construction other than those practised with the greatest success by Alderman Waterlow. The principal point on which stress was laid was, that the Government should guarantee a certain minimum rate of interest on any funds which the public might provide for these purposes; and that proposition had been brought forward by the author of the paper as an amendment upon the bill of Mr. McCullagh Torrens, the principle of which was, that Government should lend money upon the security of the buildings, when erected, at a low rate of interest. There was a great distinction between the two plans, and he thought Mr. Torrens's plan was the best; for by the system of a guarantee, all security for the proper management of the property was lost, whereas, in the case of a loan, this was not so. It was to improved construction and management that they must look for success. The mere obtaining of money was of little use, unless as a means of carrying out really well-digested and well-

considered plans. Dr. Hawkesley's paper repeated, in language of a very attractive character, but still repeated, he thought with very considerable exaggeration, a great many of those statements which were frequently indulged in in the discussion of this subject. They were told that the average rate of mortality in the poor districts was 33 per 1,000; but, in considering this question, was it fair to take the maximum rate of mortality and then compare it with that in the model lodging-houses, which were occupied by the best sort of people of the class referred to—by the most industrious and cleanly as well as those with the smallest families? For it was only the better classes of workmen who could take advantage of these model dwellings. It was, therefore, an exaggeration to infer, from the fact of the mortality in these lodging-houses being only 17 per thousand, that, if such dwellings became general, the whole mortality would be reduced from 33 to 17 per thousand. As to the obtaining of capital for the erection of such dwellings, there was no doubt that, unless they could be made a profitable investment, it was useless to attempt it on a large scale. The subject was too vast to be treated as a matter of philanthropy, or otherwise than as a purely commercial question. As soon as it could be shown that good profit would result, there would be plenty of money forthcoming; but here was the difficulty. With regard to the proposition of Mr. McCullagh Torrens, he (Mr. Hawes) was not entirely an advocate for that Bill. He thought that which was prepared by the Social Science Association was superior to it. But in both Bills the great object was directed not only to providing buildings of a superior class, but also to destroying the bad buildings which now existed, and which were at the present time the seats of disease and crime. There were thus two objects to be attained. They might say to the public—"Help us, not only for the sake of the profit you will derive from the investment of your capital, but because such investment well-directed will materially reduce the rates which you pay annually, and which are owing to the presence of all this vice and misery." On such grounds as these they might fairly ask Government to lend money on good security, and they might obtain the money at the lowest rate of interest, making the Government mortgagees of the property so created. On no other condition, he thought, had they any more right to go to Government for help than had any other commercial enterprise. But could they get from Government assistance enough? He contended, if the Government lent as much money as it could upon the security of the buildings, unless the remainder of the capital would pay more than five per cent., they would not get the other half from the public. Suppose they required a capital of two millions, they might borrow one million from the Government and obtain another from the public; on the moiety advanced by Government they would pay —say 3½ per cent.—but they must make sure they could pay more than five per cent. on the other half before they could get it. They were told that 200,000 people were required to be lodged, and that the present accommodation in model dwellings extended to only 8,000 or 10,000. The implied inference was, that they at present lodged 8,000 or 10,000 adults, but this number included adults and children too; they had not, probably, more than 2,000 families housed in these places; moreover, accommodation was required for many more than 200,000—something like a million—if the question were fully dealt with. His friend Mr. Chadwick had spoken about modes of construction, but he would not follow him into those details, for he thought the builders of the metropolis might safely be trusted to find out the best way of building houses cheaply. He believed if concrete was really better than bricks they would have used it before. There was a limit to which concrete could be successfully used—beyond this point they must, of necessity, introduce bricks; and no men knew better than the great London building contractors where the economy of the one material ended and of the other began. No doubt certain qualities of bricks would absorb a considerable quantity of water if they were saturated by being immersed in it, but it could not be imagined that a brick in the ordinary position on the surface of a wall would absorb a pound of water by exposure to rain. This was one of those exaggerated statements which really did more harm than good. All exaggeration retarded rather than promoted the progress of sound principles with regard to this question, so beset as it was by real and substantial difficulties.

Mr. W. E. Newton said that past experience on this subject proved the accuracy of the remarks of the Prince Consort when he said, if they did not succeed in making these dwellings pay a good interest it would be quite impossible to meet the immense demand that had arisen for them. The philanthropic societies of which they had heard had no doubt done a great deal of good; they had inaugurated a better class of dwellings, and shown how the thing might be done; but they were a long way behind what was required. He might surprise many people when he said he thought the philanthropic societies had done wrong in endeavouring to give the working classes too many luxuries, which they did not require, and did not ask for; the consequence was the dwellings cost a great deal more than they need have done, and it followed that too high a rent must be charged. It was well known that the tenants of the houses built by these societies were not of the class which most stood in need of aid. They were the *élite* of the working classes, and formed but a small fraction of the population. Mr. Newton then proceeded to give some details of houses for the working classes which he is now engaged in constructing in Paris for the Emperor. Those houses were to be fifty-four in number, and several were already finished. They consisted of double houses, each containing apartments for six families, each family having a living room, bed room, kitchen, and separate water closet; with separate water supply for culinary and sanitary purposes. In the original plans submitted by him (Mr. Newton) to the Emperor and Empress, his Majesty made some modifications, sketching them on paper himself; and the houses were being erected according to the plans thus amended by the Emperor. There were cellars in the basements, and the cost of each of these double houses, capable of accommodating six families each, was, without the cellars, £480, and with the cellars £550 per pair. Mr. Hawes had spoken slightingly of concrete, but he could tell that gentleman that the houses were built of concrete almost entirely; and he could point them to houses he had built at Norwood, in which the entire walls, floors, and roofs, were of concrete. He had even succeeded in laying a roof, of 16 feet span and 38 feet long, not more than three inches thick of concrete. He thought that considerable economy resulted from the use of this material, as he calculated the cost was less than half what it would be if brick or stone were used. With regard to the houses in Paris, he wished to state that he started with the idea of not employing skilled labour in their construction, as that would have added very much to their cost. Acting upon that idea, loiterers on the boulevards, who were willing to work, were employed to mix the concrete and fill it into the moulds at such wages as 2½ francs per day. The operations were carried on in four houses at a time, and the walls of each were raised 18 inches or two feet per day by filling concrete into a mould fitted for the purpose, into which the concrete was shovelled, and when a piece was dry, the mould was raised and the operation repeated.

The Chairman inquired what was the thickness of the concrete walls as compared with brick walls?

Mr. Newton replied, he should not object to trust a concrete wall one-third less in thickness than one of brick. He spoke of actual construction he had carried out. He had built a garden wall 100 feet long, 9 feet high, and 9 inches thick, entirely of concrete, and it stood perfectly well. He would not hesitate to carry

up concrete walls of houses 9 inches thick and 25 feet in height.

Mr. George Cruikshank said, having given some attention to this subject for the last half-century, he had arrived at the conclusion which he had expressed as one of a deputation to Lord Derby—that, in order to remedy the great evils which had been described, it was necessary to rebuild a large part of this metropolis. His plan for doing this—which would appear in a little pamphlet shortly to be published—was that streets of houses should be built with shops below in each house, so that the street itself should form a market, from which every commodity required by the inhabitants could readily be procured. He regarded fire-proof staircases as a matter of paramount importance in dwellings for a large number of families. His plan was to have double houses, with a fire-proof staircase in the centre common to both; and he would have the rooms of such a size as to admit of thorough ventilation. A plot of ground in the City-road had been offered to him, and the only thing he wanted was the capital with which to commence building. The present model lodging-houses were good as far as they went, but they did not answer the purposes of the general community of the working classes. The idea of some persons seemed to be to build houses in which both the better and the lower classes of artizans might live. That he believed was impracticable, from the simple fact that the more respectable people would not live in the same houses with those whose habits were such as to render residential association with them impossible. The only plan was to provide separate accommodation for the respectable and well-conducted people, and that would make more room for the others. He was strongly in favour of compulsory measures being employed for compelling the owners of houses inhabited by the poor to have them well cleansed and properly ventilated. He need hardly say that in the plan he hoped to be able to carry out he had no desire for any profit to himself, but only to benefit the community.

Mr. Newton added that the houses he had built in Paris were constructed fire-proof, so that if a fire occurred in one apartment it could not communicate to another.

Mr. G. B. Galloway said he believed that concrete was the best and cheapest material, but he would combine with it a kind of skeleton framework, which would be filled up with concrete, and thus form the house. On each floor he proposed to have four rooms, a living-room, two bed-rooms, and a kitchen, scullery, and all necessary appendages. Then he would have a bell to each floor, and have the name of the occupant on the handle, and he believed, with due regard to economy, each floor would not cost more than £120, and could be fairly let for £8 per annum. He considered it a national disgrace that no Englishman should have followed the example of George Peabody, though there were some equally wealthy who were content to express their sympathy only with the working classes, but did nothing of a practical character. He suggested that all real philanthropists should come forward and subscribe to a national fund, and then it would be very easy to secure the best plans for erecting suitable and healthy dwellings for the working classes.

Mr. Botly drew attention to one important point as affecting the healthy character of dwellings, that they should, as nearly as possible, face the south, and not the east or north.

Mr. R. N. Philips, M.P., said one of the great difficulties in the way of providing better accommodation for the working classes was how to remove the present buildings, which were not fit for human habitation. They all knew that the rights of private property must be maintained, but where private property derived a benefit from that which was detrimental to the interests of society at large, it ought to give way. Mr. McCullagh Torrens's Bill had been mentioned, and in a great measure he cordially approved of its provisions, but he would hardly go the length of raising money from the ratepayers to pay for the improvements. He was one of those who believed that if this property, which was dangerous to public health, were only destroyed, architects and builders would come forward at once and replace it with proper buildings. It was found in the manufacturing districts in the north that the only way to secure intelligent and respectable workpeople was to provide proper accommodation for them in the neighbourhood of their labour, and he believed that the same principle would be found to answer in London. If a considerable space of ground were cleared in the neighbourhood of any large works, there would be no lack of capital to build new dwellings for the working population, for the simple reason that they would be sure to be remunerative.

Mr. Robinson thought the effect of Mr. McCullagh Torrens's Bill would be rather to reward the owners of property in a bad condition for neglecting it than to inflict any loss upon them in consequence. By the provisions of the Bill, the owner could compel the Government to become the purchasers of his houses or property, and he did not see how they could provide for giving him less than the value of it as decided by the ordinary tribunals. Another proposal was that Government should purchase the equitable rights, but the great difficulty would be to ascertain what these were. He believed that the great objection to most of the philanthropic efforts in this direction was, that they put too strict a limit on themselves as to the amount of rent or profit which they would derive; and he was even of opinion that in this way they had retarded the progress which they sought to hasten, by leading commercial men and capitalists to believe that 5 per cent. was the maximum which could be obtained. For some time past he had been engaged in endeavouring to get gentlemen to invest money in buildings of this description, but he was met on all hands by the assertion that they did not pay. He said they did pay quite as well as they could be expected to do; and that being the case, similar undertakings, managed in a purely commercial spirit, would pay very well. Mr. Alderman Waterlow made his buildings pay, in some cases, 10, in others 9, 8, or 7 per cent., the average being an 8 per cent. rental, yielding 5 per cent. on the gross capital, a large portion of which was always unproductive. He believed the best thing which the philanthropic societies could do was to begin afresh, and endeavour to make the most they could out of their buildings, and thus remove the false impression which they had created. Then they might also get assistance from those who did not want 8 or 9 per cent.; he meant the class who were to be benefited. They were ready to combine in building societies, and in other ways to assist themselves and one another, and would render valuable help in this direction. There was a co-operative society in Edinburgh, established in 1861, the secretary of which had just informed him that they had already a paid-up capital of £10,000, and by a system of building houses, selling them, and re-employing the capital set at liberty, they had actually been able to build 212 houses and five shops in the outskirts of the town at a cost of £40,650. He thought the plan of selling the houses when completed, and re-employing the capital, was an advantageous one, and should not be lost sight of.

Professor Kerr said, as a writer on this subject, he should be sorry to allow the discussion to close without attempting to introduce what he considered the practical view of the case. He felt most decidedly that the Bill of Mr. Mc'Cullagh Torrens would, if passed, give a fresh start altogether to the action which had been taken with respect to the improvement of the dwellings of the working classes, but it seemed to him that the provisions of the bill were somewhat complicated. He would, as an architect and district surveyor, suggest that there was an analogous proceeding under the Building Act with regard to dangerous structures, which, if it were inquired into, would afford to Mr.

Torrens a much easier mode of attaining his object than the one he at present proposed. When a building in London was dangerous it was considered to be existing illegally, and the law could step in and pull it down, no matter who owned it, or what impediments were thrown in the way. Therefore, if a building were injurious to health and dangerous in *that* way, why could not the law be made to step in and pull it down in precisely the same manner? The mode in which a dangerous structure was pulled down was simply this:—The police, on being requested to examine a building, if it were dangerous, would pronounce it so. The matter then had simply to be carried before a magistrate (in this particular case no jury being required), and if the magistrate supported the police, down the place must come. Why could not similar machinery be put in force with regard to buildings dangerous to health? Then it was a very large question how to provide better dwellings for the working classes when the old ones were pulled down, and it was one which had not been touched that evening. Three nights had been spent in its discussion at the Institute of Architects a short time previously, in consequence of a paper which he had been permitted to read, but even those three nights of discussion did not produce very much. The subject was one which it was no use touching merely on the surface, but he might just say he did not think concrete settled the question of poor men's dwellings at all. As to building a wall in concrete two-thirds the thickness of a brick wall it was perfectly out of the question. By the building act a wall 30 feet long and 25 feet high might be built 9 inches thick, and did anyone mean to say he could build that only 6 inches thick of concrete?

Mr. Newton said he would do so.

Professor Kerr said he thought such a plan was totally impracticable.

The Chairman said he thought they had met much more to consider the political and financial mode of raising the means for erecting proper dwellings than the question of how the houses were to be constructed. He quite agreed with his friend Mr. Hawes that this matter must be considered on purely commercial principles, for it was much too large an undertaking to be carried out by mere philanthropy. He believed ten millions sterling would be required to put London into a decent and healthy condition, and it was, of course, impossible to raise such a sum as that by mere benevolence. It must be done on the commercial principle, and until they could show that there was a prospect of 8, 9, or even 10 per cent., capitalists would not even entertain the question. He must take the credit to himself of having always seen the matter in that light. The great difficulty did not lie in providing dwellings for the better class of artisans, who earned from 25s. to 30s. or 40s. a-week; they were now being provided for in a variety of ways. Houses were springing up in all directions in the suburbs, and the institution of cheap trains enabled them to travel backwards and forwards easily. No doubt there were certain classes of skilled artizans who required to live in the neighbourhood of their work, and some provision must be made for them, but that was not the great class to which they were looking, which was rather the vast mass of the population, the hand-to-mouth labourer, people who lived on a casual 13s. or 14s. a-week, perhaps not even averaging 12s. a-week all the year round. He must take a little exception to what Mr. Hawes had said about exaggeration in these matters, for he was certain no one who had dived into those haunts of misery would say there could be any exaggeration as to their shocking condition.

Mr. Hawes begged leave to explain that he only complained of exaggeration in the estimated effects of better lodgings on the rate of mortality; he did not think it was fair to put it as a reduction from 33 to 17 per cent.

The Chairman said there was no doubt that when they came to precise figures they might easily be led into error. It might be a slight exaggeration to say that the mortality would be reduced from 34 to 17 per cent., but there could be no doubt that it would be reduced very materially. It was not only the physical but the moral effects which they had to take into account, and there was no doubt that these had an immense influence on the rate of mortality. His friend Mr. Cruikshank would be rejoiced to hear that the more they improved the condition of the people—giving them plenty of fresh air and healthy rooms—the more they reduced the tendency to habits of intoxication. He did not think that, as had been stated by Mr. Newton, they gave the working classes too much; if they gave them extra accommodation they made them pay for it, apartments of three rooms being let for 7s. or 8s. a week. He believed that what was really wanted was a room at 1s. 6d. or 2s. 3d. a week, to meet the requirements of the hand-to-mouth labourer, who had no fixed wages. This was the difficulty he found in connection with Mr. McCullagh Torrens's Bill, that it made little provision except for the higher class of artisans. He provided that these wretched buildings should be pulled down, but what was to be put up in their stead? He did not contemplate the erection of a large number of houses, consisting of single rooms, in which whole families were to be maintained—and though it would be objectionable, no doubt, to give such a social arrangement legislative sanction, yet it was an evil which at present they must put up with, and it was by providing such limited accommodation, of the best possible kind under the circumstances, and at the lowest rate, that the most good could be done. In connection with this he wished to draw attention to the operation of the Sanitary Act, which was passed in very great haste at the close of the last session, in the time of the cholera epidemic. A society with which he was connected had recently received an order from the Board of Works of the St. Giles's District, giving them three months in which to carry into effect all the provisions of this Act. One of the clauses required the houses to be whitewashed at least four times a year, or oftener if necessary; that all basements should be paved; that 15 gallons of water daily should be supplied to each individual; and that 400 cubic feet of air should be allowed to each person living in them. Now, this was not as if there had been a bad state of things existing in those houses. On the contrary, for a considerable number of years they had been remarkable for health and decency. They had, therefore, as good a claim to be let alone as anyone. Their object had been to provide accommodation for the very poorest, and they had succeeded in bringing down the rent to 2s. a week for a single room; but, if all these regulations were to be enforced, they would have to raise the rent fully 30 per cent., and to turn out a considerable number of their tenants. He could not conceive anything more oppressive than these regulations, and their ultimate tendency would be to stop all improvements of this character. It was a serious inconvenience to a family which had but one room, to have it completely whitewashed even once a year, and if that were increased to four times, it would be an intolerable nuisance. He believed that the Board of Works were acting in accordance with the letter, but in contradiction to the spirit, of the statute, and he hoped that they would go so far that public feeling would be aroused, and an alteration made in the law. He concluded by proposing a cordial vote of thanks to Dr. Hawksley for his most interesting paper.

Dr. Hawksley, in reply, remarked that the discussion having continued to so late an hour, he did not wish to keep the meeting a moment longer than necessary, and especially as the chairman had already so completely answered many of the objections that had been advanced. He only wished to explain to Mr. Hawes that no new designs for erecting buildings for the poor had been advocated in his paper, because he considered that the real difficulties of the case did not

lie in that direction; he thought they were much more in the nature of the means whereby to carry out the excellent and improved designs that already existed; consequently all the force of his argument had been thrown into the question of the best mode of obtaining the large amount of money necessary for the purpose. With regard to the objection of comparing the diminished mortality in the improved dwellings, not with the ordinary rate of the metropolis, but with that of the neighbourhood in which those improved dwellings were situated, he thought he had carefully protected himself from all charge of exaggeration by considering that, if seventeen per thousand be the mortality of the population in the improved dwellings, and twenty-four that of the metropolis, it followed (the mortality of the upper and middle classes in London not being more considerable than that of the inhabitants of the model lodgings) that, supposing of the three millions of population in the metropolis, two of them, represented by the upper, middle, and well-lodged of the humbler classes, corresponded to the rate of 17 per thousand, there would of necessity be a death-rate as high as 38 per thousand for the remaining million to make up the average of 24. In making the comparison therefore of 17 to 33 as the probable difference between the inhabitants of the improved dwellings and those of the squalid abodes round them, he thought he was quite within the limits of fact. He was sorry that the time would not allow him to answer the other gentlemen who had kindly assisted in the discussion, and he begged to thank Mr. Newton for his interesting information regarding concrete which accorded with that he had received through other channels.

Mr. W. E. Newton writes as follows:—As some of the gentlemen who spoke after me appeared somewhat sceptical as to the strength of concrete and its applicability for the construction of buildings, and seemed to think that the advocacy of this material was an "amiable weakness," it may perhaps be interesting to state the nature and composition of the concrete which has been successfully used in constructing the Emperor's "Maisons Ouvrières" in the Avenue Dumesnil, Paris, and also that used by me in the works I have carried out here. In Paris we used one part of Portland cement (C. Francis and Sons) to five parts of large gravel stones, varying in size, from the size of pearl barley to that of peas. The fine sand is sifted or screened out, put on one side, and used for making stucco for facing the work. At this place I find it more economical to use burnt brick earth, or "brick ballast," as it is called, from which I sift out the very fine, and add one of Portland cement to 8 of ballast. This makes a very hard wall. I have even reduced the cement to one in ten with perfect success. I burn the ballast myself and it costs me under 2s. per cubic yard. Therefore, if we take one yard of ballast at 2s., and $2\frac{1}{2}$ bushels of cement at 1s. 10d., we shall have a cubic yard of concrete for 6s. 7d., to which add 2s. 3d. per yard for labour, and we shall find we can put up a superficial yard of nine-inch work for less than 3s. One gentleman ventured to question the possibility of building a wall 30 feet high in 9-inch work. I only say that this has been done by Mr. Tall, and the houses so constructed have been sold by him at a very large profit. From the numerous experiments I and others have made in concrete constructions, I have no hesitation in offering the following challenge to the sceptics, viz., that they shall build a wall of any dimensions in common brick and mortar with or without Tyerman's bond, and I will build one in concrete; and if the concrete wall does not sustain a greater weight than the brick wall I will forfeit to them £50 and the cost of the wall, they undertaking the same liability to me should the brick wall not stand an equal test."

Mr. Samuel Sharp has forwarded the following statement relative to the cost of constructing dwellings of concrete for the labouring classes, viz.:—

(1.)	One room, 12 ft. by 12 ft. and 7ft. high ..	£30
(2.)	Two do., „ „ ..	60
(3.)	Suite of 3 rooms, scullery, and w. c. ..	100
(4.)	Do. 2 do., „ „ ..	75

The saving by building of concrete and Nicol's patent partitions and roofs is 25 per cent.

Ground rent for 3 rooms, £3 per annum.
Do. 1 room 4d. to 6d. per week.
Do. 2 rooms 7d. to 10d. do.

in the centre of London; in the suburbs at least one-half less.

The foregoing calculation is without including the purchase of the land. If this is added, the sums (1), (2), (3), and (4), will be raised to £50, £100, £160, and £115 respectively.

Proceedings of Institutions.

Union of Lancashire and Cheshire Institutes.—Special Prizes for 1867.—The Council of the Union offer the following extra prizes to candidates connected with Institutes in the Union:—1. Two prizes, of £1 10s. and £1, to the two candidates who shall obtain the highest aggregate number of marks at the Society of Arts' Examinations. 2. A copy of Black's Atlas will be given to the candidate who shall obtain the highest aggregate number of marks in Geography at the examinations of the Society of Arts and the Science and Art Department; donor, Mr. J. Heywood, Manchester. 3. A chemical laboratory, suitable for the private study of chemistry, will be given to the candidate who shall obtain the highest aggregate number of marks in Chemistry at the examinations of the Society of Arts and Science and Art Department; donor, Mr. Woolley, Manchester.

PARIS UNIVERSAL EXHIBITION.

The commissioners appointed by Her Majesty to advise on the best mode by which the products of industry and the fine arts of the United Kingdom, the British colonies, and dependencies, may be procured and sent to the Universal Exhibition of Works of Industry and Agriculture to be holden in Paris in the year 1867, and to appoint jurors, have appointed the following as presidents, vice-presidents, jurors, and associates, to represent the United Kingdom in the International Jury.

List of Jurors and Associate Jurors.

(The names in parentheses are associate jurors.)

Works of Art.—Paintings in oil, Viscount Hardinge (John Leslie, Esq.). Other paintings and drawings, Hon. Spencer Cowper (S. Vincent, Esq.). Sculpture and die-sinking, A. H. Layard, Esq., M.P. (W. Calder Marshall, Esq., R.A.). Architectural designs and models, J. Fergusson, Esq. (Lieut.-Colonel Scott, R.E.). Engraving and lithography, R. J. Lane, Esq., A.E.R.A.. and F. Seymour Haden, Esq., F.R.C.S. (Julian Marshall, Esq.)

Apparatus and Application of the Liberal Arts.—Lord Houghton, Vice-President. Baillie Cochrane, Esq., M.P., Associate Vice-President. Printing and books, George Clowes, Esq. (C. Rivers Wilson, Esq.). Paper, stationery, binding, painting, and drawing materials, Warren de la Rue, Esq., F.R.S. (F. Hankey, Esq.) Applications of drawing and modelling to the common arts, R. Redgrave, Esq., R.A. (H. A. Bowler, Esq.) Photographic proofs and apparatus, Dr. Hugh W. Diamond (Lieutenant-Colonel Gordon, C.B. R.E.). Musical instruments, Lord Gerald Fitzgerald. (Hon. Seymour Egerton, 1st Life Guards.). Medical and surgical instruments and apparatus, Sir J. F. Olliffe, M.D. Mathematical instruments and apparatus for teaching science, C. Brooke, Esq., M.A., F.R.S. (Lieutenant-Colonel Strange, F.R.S., F.R.A.S.). Maps and geographical and cosmographical apparatus, Captain G. H.

Richards, R.N. (Lieutenant-Colonel A. C. Cooke, R.E., F.R.G.S.).

Furniture and other Objects for the Use of Dwellings.—Fancy furniture, J. H. Pollen, Esq., M.A. Upholstery and decorative work, Matthew Digby Wyatt, Esq., F.S.A. Crystal fancy glass and stained glass, E. W. Cooke, Esq., R.A., F.R.S. (Henry Chance, Esq.). Porcelain, earthenware, and other fancy pottery, Right Hon. W. E. Gladstone, D.C.L., M.P. (J. C. Robinson, Esq., F.S.A.). Carpets, tapestry, and other stuffs for furniture, Peter Graham, Esq. Paper hangings, J. G. Crace, Esq. Cutlery, G. Wolstenholm, Esq. (C. Asprey, Esq.). Gold and silver plate, Percy W. Doyle, Esq., C.B. (G. J. Cayley, Esq.). Bronzes and other art castings and repoussé work, no juror allowed. Clocks and watches, C. Frodsham, Esq. Apparatus and processes for heating and lighting, Professor J. Tyndall, LL.D., F.R.S. (Rear-Admiral Ryder, R.N., C.B.). Perfumery, Dr. W. Odling, F.R.S. Leather work, fancy articles, and basket work, J. M. Stanley, Esq. (F. West, Esq.).

Clothing (including Fabrics) and other Objects worn on the Person.—Duke of Manchester, President; the Right Hon. Sir W. Hutt, M.P., K.C.B., Associate President. —Cotton thread and fabrics, Malcolm Ross, Esq. Thread and fabrics of flax, William Spotten, Esq. Combed wool and worsted fabrics, W. Morris, Esq. (J. Law, Esq.). Carded wool and woollen fabrics, Edward Huth, Esq. (H. S. Way, Esq.). Silk and silk manufactures, Sir B. S. Phillips (C. S. Haden, Esq.). Shawls, W. H. Clabburn, Esq. Lace, net, embroidery, and small ware manufactures, Daniel Biddle, Esq. (Thomas Ball, Esq.). Hosiery and under-clothing, and articles appertaining thereto, A. J. Mundella, Esq. Clothing for both sexes, Lieut.-Colonel Hudson. Jewellery and precious stones, Earl Dudley (N. H. M. S. Maskelyne, Esq.). Portable weapons, arms, and military equipment, Major-General Sir W. Gordon, R.E., K.C.B. (Major-General C. Dickson, R.A., C.B.). Travelling articles and camp equipage, Sir S. Baker and Edward Page, Esq. (M'Leod of M'Leod). Toys, no juror allowed.

Products (Raw and Manufactured) of Mining Industry, Forestry, &c.—Mining and Metallurgy, S. H. Blackwell, Esq. (Captain W. S. Roden). Products of the cultivation of forests, and of the trades appertaining thereto, Hon. F. D. M'Gee (P. L. Simmonds, Esq.). Products of shooting, fishing, and of the gathering of fruits obtained without cultivation, Professor Wyville Thomson, F.R.S. Agricultural products (not used as food) easily preserved, D. Hanbury, Esq. (Dr. T. Thomson, F.R.S.). Chemical and pharmaceutical products, Dr. Frankland, F.R.S. (Dr. David Price). Specimens of the chemical processes for bleaching, dyeing, printing, and dressing, Sir Robert Kane, F.R.S. (Dr. David Price). Leather and skins, Dr. Forbes Watson, A.M., F.R.S. (J. Evershed, Esq.).

Apparatus and Processes Used in the Common Arts.—Lord Richard Grosvenor, M.P., Vice-President; H. C. E. Childers, Esq., M.P., Associate Vice-President. Apparatus and processes of the art of mining and metallurgy, W. Warrington Smyth, Esq., M.A., F.R.S., Pres., G.S. (Dr. C. Le Neve Foster, F.G.S.). Agricultural apparatus and processes used in the cultivation of fields and forests, Jacob Wilson, Esq. Apparatus used in shooting, fishing-tackle, and implements used in gathering fruits obtained without culture, Col. Hon. F. H. Keane (Major Edwards, R.E.). Apparatus and processes used in agricultural works and in works for the preparation of food, James C. Amos, Esq. (C. Wren Hoskyns, Esq.). Apparatus used in chemistry, pharmacy, and in tan-yards, Dr. Lyon Playfair, C.B., F.R.S. (Professor T. C. Archer). Prime-movers, boilers, and engines especially adapted to the requirements of the exhibition, J. Scott Russell, Esq., M.A., F.R.S. (Captain Beaumont, R.E.). Machines and apparatus in general, the Earl of Caithness and Robt. Mallet, Esqrs., Mem.I.C.E., F.R.S. (John Anderson, Esq.). Machine tools, G. W. Hemans, Esq., Mem.I.C.E., F.R.G.S., F.G.S. Apparatus and processes used in spinning and rope-making, R. D. Marshall, Esq. Apparatus and processes used in weaving, M. Curtis, Esq. Apparatus and processes for sewing and for making up clothing, Peter Tait, Esq. (Captain Ponsonby Cox, R.E.). Apparatus and processes used in the manufacture of furniture and objects for dwellings, Lieut.-Colonel Ewart, R.E. Apparatus and processes used in paper-making, dyeing and printing, Wyndham S. Portal, Esq. Machines, instruments, and processes used in various works, C. F. Bayer, Esq. Carriages and wheelwrights' work, G. N. Hooper, Esq. Harness and saddlery, Captain Fenn (Henry Göschen, Esq.). Railway apparatus, J. E. M'Connell, Esq., Mem.I.C.E. (Sir D. Campbell, Bart.). Telegraph apparatus and processes, C. Wheatstone, Esq., F.R.S. (Lord Sackville Cecil). Civil engineering, public works, and architecture, C. H. Gregory, Esq., Mem.I.C.E. (Major A. Clarke, R.E.). Navigation and life-boats, Captain E. Arrow. (Rev. J. Woolley, LL.D.).

Food (Fresh or Preserved) in Various States of Preparation.—Cereals and other eatable farinaceous products and the products derived from them, J. Druce, Esq. (C. Woolloton, Esq.). Bread and pastry, no juror allowed. Fatty substances used as food, milk and eggs, no juror allowed. Meat and fish, no juror allowed. Vegetables and fruit, no juror allowed. Condiments and stimulants, sugar and confectionary, G. Moffatt, Esq., M.P. Fermented drinks, Hon. H. G. Howard (E. L. Beckwith, Esq.).

Live Stock and Specimens of Agricultural Buildings.—Farm buildings and agricultural works, no juror allowed. Asses, horses, mules, M. Higgins, Esq. (Captain Cockerell). Bulls, Buffaloes, &c. Sheep, goats. Pigs, rabbits. Poultry. Sporting dogs and watch dogs. Useful insects. Fish, crustacea, and mullusca. No jurors allowed.

Live Produce and Specimens of Horticultural Works.—Duke of Cleveland, K.G., president. Hothouses and horticultural apparatus, Professor Balfour, M.D. (Dr. T. Thomson, F.R.S., also in raw and manufactured products). Flowers and ornamental plants. Vegetables. Fruit trees, no jurors allowed. Seeds and saplings of forest trees, Dr. J. D. Hooker, F.R.S. (Dr. Moore). Hot-house plants, James Veitch, Esq. (F. W. Brady, Esq., Q.C.).

Articles Exhibited with the Special Object of Improving the Physical and Moral Condition of the People.—Sir J. P. Kay-Shuttleworth, Bart., vice-president. Apparatus and methods used in the instruction of children, Rev. Canon Norris, M.A. (E. C. Johnson, Esq.). Libraries and apparatus used in the instruction of adults at home, in the workshop, or in schools and colleges, Rev. W. Rogers, M.A. (Rev. M. Mitchell, M.A.). Furniture, clothing, and food from all sources, remarkable for useful qualities combined with cheapness, Viscount Canterbury (Nassau J. Senior, Esq.). Specimens of the clothing worn by the people of different countries, no juror allowed. Examples of dwellings characterised by cheapness combined with the conditions necessary for health and comfort, no juror allowed. Articles of all kinds manufactured by skilled workmen, no juror allowed. Instruments and modes of work peculiar to skilled workmen, no juror allowed.

(Signed) ALBERT EDWARD, P.

OPENING OF THE PARIS EXHIBITION.

The exhibition was duly opened on Monday, April 1st, according to the original arrangement. His Majesty the Emperor, accompanied by the Empress, arrived at the chief entrance to the park and passed up the main avenue to the chief door of the building.

Within a few days the appearance of this part of the park has undergone an extraordinary change; tall Venetian masts, painted green and relieved by gilding, have been set up on each side along the entire length of the avenue, about five hundred feet, and between these, at

mid-height, are stretched a series of strong squares of canvas, covered on the under side with a handsome green material, powdered with golden bees. These squares are united to each other by means of a series of hooks, and form a truly imperial canopy along the entire route, the effect being greatly heightened by a bordering of the same material as the velum, dentated and enriched with a bold pattern in gold embroidery. At the top of the masts, and also on the flag staves on the building itself, float brilliant pennons, which give a festive air to the whole scene and relieve the effect of the massive iron structure in a very agreeable manner.

Entering the building by the chief door, the imperial party halted for a few moments in the open space in the great machinery court, between the limits of the French and English sections. The two sides of this space present a curious contrast; on the French are trophies of iron and brass work and materials, towering up to within a few feet of the spring of the roof, while on the English side stands the Victoria gold pyramid, which since 1862 has grown to the height of sixty or seventy feet; around its base are ranged the steam cranes which have performed signal service in the arrangement of the British section, and on the opposite side of the gallery stand an Eng ish pillar post-box, a series of sorting tables, and other post-office materials, and a beautiful model railway with a travelling post-office, consisting of three vans, that in the centre acting as a tender to the other two, and being fitted with the ingenious apparatus for taking in and delivering the mails *en route*. These models are made to the scale of 1 in 4, are beautifully made, and exhibit the whole arrangement in an admirable manner. On one of the descriptive blinds of the great windows above, the invention, if the expression may be used in such a case, of penny postage is recorded in full characters beneath Sir Rowland Hill's name.

Starting from this point, the imperial party and suite made the complete tour of the machinery court by the spectators' gallery in the centre.

The sides of this gallery are carried out at intervals so as to form niches, and in these latter the foreign commissioners and jurors, each party in their own "sector" of the building, were placed and presented to their Majesties in succession.

The whole of the machinery and other articles exhibited in this great court are not yet in perfect order, but there are very few vacant spaces, and the mass collected within the iron walls is prodigious.

Having made the complete circuit of the building, their Majesties passed through the grand vestibule to the French Fine Art Court. The vestibule does not possess the magnificent proportions of the grand naves of either of the previous Universal Exhibitions, and its roof is heavy, both in form and colour. Nearly the whole of the clerestory windows, both on the French and English sides, are filled with stained glass, much of it brilliant in colour, and generally, though not universally, harmonious; while the bays below exhibited a splendid collection of wares of various kinds. On the English side these bays, which form the termini of the various groups, have been completely arranged for some days, and called forth great admiration. The beautiful casts of the sculptured works from Campo Santo and St. Jago have already been mentioned. Near these stands a magnificent chimney-piece, in alabaster, with inlaid panels and cameos, by Wedgwood; a splendid collection of china vases, majolica, and other wares, by Minton and Copeland; a number of Elkington's beautiful reproductions; some good furniture, and other articles. On the French side, the arrangements were not sufficiently advanced to allow of anything like a complete show.

From the vestibule their Majesties entered the French portion of the Fine Art Gallery, and again made the tour of the building, though by a much more contracted zone; two *détours* were also made across the central zones, occupied by the industrial groups, by the two principal side avenues of the building, the Rue de France and the Rue de Russie.

In the various sections of the Fine Art galleries were stationed the ministers and officers of state, the diplomatic body, those ladies and gentlemen who had been honoured with special invitations, together with the foreign commissioners, jurors, and others who had quitted the gallery in the Machinery Court after the passage of the Imperial party.

The last section visited was the English Fine Art Court, and quitting this their Majesties passed across the enclosed garden along the avenue at the opposite side of the building, the Rue de Belgique and the park, by the gate opposite to that by which they had entered.

A good deal still remains to be done in the way of final arrangement, but the Exhibition presented on the whole a very creditable appearance, considering the vastness of its plan and the space which it occupies. The Russian, Swedish, Danish, and English departments may be said to be complete; in nearly all other sections of the building the imperfections were more numerous.

The picture galleries have all their walls nearly covered; the English gallery was not only arranged but matted and comfortable, and the whole collection of pictures is, beyond question, one of the finest that has been seen since 1855.

The weather was magnificent for April, indeed, it would have been fine for May; the sun was never once crossed by a cloud. The number of persons present was large—it is impossible to say how large—and the opening of the Exhibition, although not a ceremonial, must be considered a success.

Publications Issued.

Paris Universal Exhibition, 1867: the Complete Official Catalogue, English Version. Published under the authority of the Imperial Commission, by J. M. Johnson and Sons, Castle-street, Holborn, London; F. Dentu, Paris, Editeur de la Commission Impériale. This version was translated from the proof sheets of the French Catalogue, published by the Imperial Commission, and it is believed that this is the first instance in the history of International Exhibitions in which a complete catalogue has been prepared in a language foreign to the people where the exhibition was held. The translation was made by Mr. G. W. Yapp, who, as stated in the preface, only received the principal part of his copy within the last month, so that the volume has been produced with extraordinary rapidity, as it was in the hands of the public on the 29th ult. The price is 5s.

Paris Universal Exhibition, 1867.—Catalogue of the British Section. Printed for Her Britannic Majesty's Commissioners, and sold by Spottiswoode and Co. —This work contains a list of the exhibitors of the United Kingdom and its colonies, and the objects which they exhibit, and is in four different languages, English, French, German, and Italian. The introduction includes a brief account of the three previous International Exhibitions, and a statistical summary of the industries and commerce of the United Kingdom, prepared in accordance with the wishes of the French Commission. There is an illustrated appendix, containing detailed notices of many of the objects exhibited, the whole forming a thick volume, price 3s. 6d.

Correspondence.

Mr. Young's Paper on Flax.—Sir,—In your report of the discussion on Mr. Young's paper on "Flax," read

on Wednesday, the 27th ult., there is an inaccuracy in the first part of my remarks, which I shall be much obliged by your correcting. Instead of "800 acres of land, and producing about 3,000 tons of flax per annum," please read, "800 acres of land, *or* about 3,000 tons of *flax straw* per annum." Also my name is as undersigned. I am, &c.,
JOHN C. WILSON.
East India House, 5, Lime-street, March 30, 1867.

MEETINGS FOR THE ENSUING WEEK.

MON.....Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
London Inst., 7. Prof. Westwood, "On Entomology."
R. United Service Inst., 8½. Capt. Majendie, "On Military Breech-loading Small Arms."
R. Geographical, 8½. 1. Lieut. J. B. Bewsher, "Site of Kanaxa and Ancient Canals in Mesopotamia." 2. Mr. J. E. Taylor, "Sources of the Lycus and other Rivers in Kurdistan." 3. Mr. R. J. Garden, "Description of Diarbekr."
British Architects, 8.
TUES ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Brooks' "Memoir on the River Tyne;" and (time permitting) Col. Sir Wm. Denison, "The Suez Canal."
Photographic, 8.
Ethnological, 8. 1. Dr. Hyde Clarke, "On Ancient European Mines." 2. Mr. J. Crawfurd, "On the Classification of the Races of Man according to the Form of the Skull." 3. Dr. Collingwood, "Visit to the Kibalan Village of Sano Bay, on the N.E. coast of Formosa."
Royal Inst., 3. Rev. G. Henslow, "On Botany."
WED ...Society of Arts, 8. Mr. Robert Galloway, "On the Operation of the Chain Cables and Anchors Act, 1864."
Graphic, 8.
R. Society of Literature, 4½.
Archæological Assoc., 8½.
THUR ...Royal Inst., 3. Mr. Pengelly, "On the Antiquity of Man.'
Zoological, 8½.
Syro-Egyptian, 7½. Dr. T. B. Lowne, "On the Botany of Palestine."
Royal Society Club, 6.
Royal, 8½.
Antiquaries, 8½.
London Inst., 7. Prof. Bentley, "On Botany."
Naval Architects. Morning meeting, 12. Evening at 7.
FRI .....Astronomical, 8.
Royal Inst., 3.
R. United Service Inst., 3. Captain G. V. Fosbery, "On the Umbeyla Campaign of 1863."
Naval Architects. Morning meeting, 12. Evening at 7.
SAT .....Royal Inst., 3. Mr. Pengelly, "On the Antiquity of Man."
Naval Architects, 12.

Patents.

From Commissioners of Patents' Journal, March 29th.

GRANTS OF PROVISIONAL PROTECTION.

Ball or supply valves—690—J. Pearson.
Boots, &c.—418—T. Greenwood and J. Keats.
Boots, &c., cleaning—655—H. Churchman and F. Braby.
Bottles, &c., stopping—689—P. Duchamp.
Breech-loading fire-arms and cartridges—717—M. A. F. Mennons.
Bridles and reins—675—J. G. Tongue.
Buffing springs—704—H. L. Corlett.
Candles, ornamenting—671—A. Field and W. B. Nation.
Charcoal, animal—707—J. F. Brinjes.
Clay, utilizing—551—A. McDougall.
Electric telegraph conductors—694—D. Nicoll.
Engines—633—A. L. Normandy.
Fabrics, drying—698—W. Clark.
Fabrics, mangling—653—C. Mather.
Fibres, &c., twisting, &c.—541—W. Dyson.
Fibrous materials, cleansing—713—J. L. Norton.
Fibrous materials, preparing—555—S. Shore.
Fibrous materials, spinning, &c.—627—H. Barton and E. Whalley.
Fibrous materials, spinning, &c.—693—W. Dempsey.
Fibrous substances, grinding—714—W. Wood.
Filtering presses—587—E. T. Hughes.
Fire-arms, breech-loading—502—W. P. Gray.
Fire-arms, breech-loading—537—J. R. Cooper.
Fire-arms, breech-loading—677—M. A. F. Mennons.
Fire ranges—635—E. K. Heaps and T. P. Moorwood.
Fluids, measuring—631—C. W. Siemens.
Gas, &c., combusting—692—E. T. Hughes.
Hooks, hat and coat—710—J. A. Fussell.
Hops, drying—520—W. H. Samson.
Horses' feet, coverings for—533—G. Haseltine.
Horse-shoes—695—W. Akers.
Iron, &c., coating—657—J. Turner.
Knobs—691—J. B. Fenby.
Ladies' garments, springs for—545—L. H. Philbois and A. Marcha.
Lamps—667—G. Dümler.
Land, tilling—497—J. Phillips-Smith.
Light, &c., obtaining—458—J. H. Johnson.
Lockets—665—T. S. Turnbull.
Metallic bedsteads—639—R. Luke and W. Parkes.
Minerals, mining, &c.—535—A. Howat.
Mines, ventilating—552—C. J. Pownall.
Mixing apparatus—637—A. Giles.
Motive-power engines—700—R. Wilson.
Mud, &c., mowing—702—T. Burt.
Paper—647—E. Lloyd.
Piston-rods, &c., packing for—543—J. McLintock.
Propulsion—696—M. P. W. Boulton.
Pterotypes—3163—J. Pratt.
Railways—549—A. V. Newton.
Railway signals, &c.—547—J. Livesey, J. Edwards, and W. Jeffreys.
Safety valves—643—A. V. Newton.
Sash fastenings—683—M. Cavanagh.
Sewing machines—687—A. Kimball.
Sizing and dressing machines—673—W. S. Lowe.
Slop pail and night commode, a combined—706—A. Parkinson and D. Sweaney.
Steam boilers—661—C. Mace.
Steam boilers—679—R. D. Napier.
Steam, generating—514—J. C. R. Weguelin and B. Hirst.
Steam, generating—645—J. G. Woodward.
Taps and valves—709—C. Maschwitz, jun.
Textile fabrics, printing on—346—R. E. Green and W. Laycock.
Valves—703—B. P. Walker.
Vulcanite, baking—688—F. Ryding.
Washing machines—697—M. Chamberlaine.
Weaving, looms for—716—W. J. Sleath and J. Hargreaves, jun.
Weaving, looms for—719—J. Boyd.
Wheel moulding machines—715—J. Willcock and S. Mason, jun.
Yarns, winding, &c.—712—W. Hall.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Flour—838—G. T. Bousfield.

PATENTS SEALED.

2525. P. R. Hodge.
2526. A. M. Dix.
2531. F. Tolhausen.
2532. J. Cavanmah.
2545. R. Mortimer.
2558. D. H. Saul and H. P. Armstrong.
2563. F. W. Kaselowsky.
2564. F. W. Kaselowsky.
2579. W. Clark.
2589. W. Clark.
2613. G. Pitt.
2615. E. Peyton.
2630. A. V. Newton.
3022. T. W. Webley.
3410. F. Watkins.
3412. F. Watkins.
96. G. Haseltine.
124. H. Starr.
128. B. Lietar.
138. A. V. Newton.

From Commissioners of Patents' Journal, April 2nd.

PATENTS SEALED.

2324. P. J. Railton & D. Walton.
2530. T. Berney.
2536. C. E. Brooman.
2537. M. West.
2551. J. W. Daniell.
2556. J. A. Coffey.
2571. G. Gordon.
2573. W. E. Hickling.
2574. S. Deacon.
2581. A. Ripley.
2677. J. G. Tongue.
2687. G. Haseltine.
2722. T. Booth.
3161. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

770. M. Henry.
766. E. Pace.
845. J. N. Douglass.
769. J. Lightfoot.
772. J. Rees.
782. A. Heald.
833. W. E. Newton.
787. D. Treadwell.
791. T. J. Smith.
815. W. E. Newton.
880. C. A. Ferguson, jun., and T. Ferguson.
776. E. Grether.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

805. S. R. Smith.
808. A. Pentzlin.
820. J. Reidy.

Registered Designs.

4846—March 13—A grooved back strap for the Albini gun—H. Homer, Birmingham.
4847—March 13—A pair of shutter shoe fasteners—J. Harrison, 15, Union-street, Borough.
4848—March 18—Fitting for boxes or cases for packing guns and bayonets—Dean and Taylor, Birmingham.
4849—March 19—Friar Bacon's Miracle—M. Davis, 163, Strand.
4850—March 27—Apparatus for supplying boilers with substances to prevent incrustation—W. Oxley, Manchester.
4851—March 28—An indented eye needle—J. Beard, Birmingham.